REMARKS

The office action of July 7, 2010, has been carefully considered.

It is noted that claim 5 is objected to as being in improper form.

Claims 1, 4-15, 17 and 40-42 are rejected under 35 USC 103 (a) over Lin, et al. 2001 in view of Hansen, Martin, and Glass.

Claims 16, 20 and 21 are rejected under 35 USC 103 (a) over Lin, et al. 2001 in view of Hansen, Martin and Glass and further in view of Tyszblat.

Claims 18 and 19 are rejected under 35 USC 103 (a) over Lin, et al. 2001 in view of Hansen, Martin and Glass and further in view of Kondo.

Claim 43 is rejected under 35 USC 103 (a) over Lin, et al. 2001 in view of Hansen, Martin and Glass, and further in view of Beesabathina.

In view of the Examiner's objection to and rejections of the claims, Applicant has canceled claim 5.

It is respectfully submitted that the claims now on file differ essentially and in an unobvious, highly advantageous manner from the methods disclosed in the references.

In connection with the objection to claim 5, Applicant has

canceled this claim. With this cancelation it is respectfully submitted that the objection to claim 5 is overcome and should be withdrawn.

Turning now to the rejection based on prior art, Applicant submits that the Examiner is only picking individual aspects of the various references and combining them. However, Applicant submits that the references, in order to be combinable, must be in the same field of endeavor and the respective teachings as a whole must suggest a combination at least in some way. If the respective teachings contradict each other or teach away from each other the references cannot be combined. In the present situation the reference to Lin, et al. and the reference to Martin, et al. cannot, and in fact must not, be combined.

Lin, et al. teaches the consecutive, repeated infiltration of zirconia preforms with liquid solution of mullite precursor solutions, each for a time of 24 hours. The theoretical density of the resulting samples only reaches 96 to 98% of the respective theoretical densities. According to the teachings of Lin, et al., this maximum density of 98% cannot be increased any more. This can be derived from the example on page 78, left column, last paragraph, wherein it is stated that "after sintering at 1500° C for two hours, the saturation-infiltrated preforms could be densified to about 98% of the theoretical density". The critical

term here is "saturation-infiltrated"; this means that the porous zirconia preforms have been repeatedly infiltrated until saturation of mullite precursor is reached (see page 71, right column, third paragraph).

Accordingly, the only teaching in this reference that enables one skilled in the art to reach high theoretical densities is by repeatedly infiltrating the preforms with mullite precursors. Additionally, the only teaching that one skilled in the art would take away from this reference is that at best a theoretical density of 98% can be reached. Most importantly, one skilled in the art would derive from Lin, et al. that higher theoretical densities are impossible to reach because higher infiltrations than those leading to saturation are not possible, according to the teachings of the reference.

The reference of Martin, et al., on the other hand, addresses a totally different problem. The problem in this reference is to infiltrate zirconia (which in Lin, et al. and the present invention is the preform, and not the infiltrate). This reference further teaches that in order to obtain maximum toughness and strength of the composites produced, the zirconia has to be in tetragonal phase (see page 7, lines 26 et sec). The objective of this reference is to provide composite ceramics with high strength and lowered density (see page 4, lines 4-6). Accordingly, the

only teaching one skilled in the art would draw from this reference is how an infiltrate of zirconia into a porous preform can be used to obtain composites of certain properties. What a person skilled in the art would not derive from this reference is how any other infiltrate would behave in a zirconia preform as a matrix, which is quite the opposite to what is described in Martin, et al.

Furthermore, it is noted that the 10-15 minutes given in the section drawn to infiltration in Martin, et al. are not the lower border of the needed amount, but only a portion thereof. On page 6, lines 23-26 it is stated that the compact may be gradually submerged in the sol. This leads to an immediate beginning of infiltration due to capillary forces, due to this being done gradually, it will require a certain amount of time in the first place. Then, it is stated that when the compact is submerged, the vacuum may be increased and the sample soaked for a period of time, for example for 10-15 minutes, hence the real time needed for infiltration is higher than the given 10-15 minutes.

This is also proven in and illustrated by the examples, namely example 2. At page 10, lines 16-19 Martin, et al. state that the sol intended to be infiltrated is introduced into the chamber, in which the preform already rests, via a stop cock at a rate of approximately one drop per second until the sample is

fully submerged. After that, the vacuum was increased and the samples were soaked for a period of 20 minutes, which leads to an infiltration time of much higher than 20 minutes. According to page 12, lines 2 and 3 of Martin, et al. the sintering time and temperature should be maximized with respect to density and the fraction of a tetragonal zirconia retained. According to Figure 4 of Martin, et al., the fraction of a tetragonal zirconia decreases with increasing theoretical density; therefore, as the tetragonal phase of zirconia needs to be present in an amount as high as possible, Martin, et al. teaches away from aiming at theoretical densities of above 98%. In fact, Martin, et al. teaches that the theoretical density should be as low as possible in order to retain as much of the tetragonal zirconia phase as possible.

This clearly demonstrates that the object and teaching of Martin, et al. are not combinable with the teachings of Lin, et al. which uses a totally different precursor and an entirely different preform (zirconia).

Furthermore, on page 13, lines 26-29 of Martin, et al., the strength of the resulting ceramic composites are given as 750MPa or 650MPa, which in both cases is much lower than what is needed according to the presently claimed invention.

The problems associated with the teachings of Martin, et al. lead to the fact that persons skilled in the art would never

consider combining the teachings of Martin, et al. with Lin, et al. because the problems that are to be overcome according to Martin, et al. can never arise in the context of the teachings of Lin, et al., since zirconia is only used as the preform in Lin, et al. and, thus the problem of how to infiltrate it in order to reach as high a tetragonal fraction as possible cannot arise at all.

In Lin, et al., the problem on the other hand is how to achieve composites with good properties by infiltrating a zirconia matrix with entirely different compounds, which, due to being entirely different chemical compounds, have entirely different problems associated therewith. All of the procedural actions in Martin, et al. aim at entirely different substances and entirely different problems and thus cannot, and in fact must not, be combined with the teachings of Lin, et al. To do so would mean to disregard the teachings of the respective documents as a whole.

In this context, Applicant directs the Examiner's attention to the paragraph beginning on line 32 of page 1 of the specification of the present application which discusses the Martin, et al. reference. It is stated in this paragraph that "it will be understood that a zirconium oxide ceramic with a high critical stress intensity factor cannot be strengthened further by the addition of zirconium oxide." This knowledge which was

available to those skilled in the art at the time of the filing of the present application further teaches the skilled artisan away from combining Martin, et al. with Lin, et al. since a skilled artisan already knows that infiltration of a zirconium oxide ceramic with zirconia would be entirely pointless.

Also, the Hansen, et al. reference would not be combined with either Lin, et al. or Martin, et al. for the following reasons. According to Hansen, et al. a type of infiltration is achieved by heating at 1100° C for 2-4 hours (see page 4, lines 32-36 and claim 4). Neither Lin, et al. nor Martin, et al. describe a remotely similar process, as Hansen, et al. first provides a substructure and then applies a layer of glass onto it and then heats it up to 1100° C for 2-4 hours, whereby the glass material is absorbed in the superstructure material. Accordingly, Hansen, et al. neither teach immersing a preform in any kind of infiltrate solution nor the infiltration in a similar manner as Lin, et al, or Martin, et al.

Accordingly, Applicant submits that based on the teachings of Lin, et al., Martin, et al. and Hansen, et al., one skilled in the art would never consider combining these teachings.

The patent to Glass which was discussed in a previous amendment in detail, adds nothing to the teachings of the above discussed references so as to arrive at the presently claimed

invention.

In view of these considerations it is respectfully submitted that the rejection of claims 1, 4-15, 17 and 40-42 under 35 USC 103 (a) over a combination of the above discussed references is overcome and should be withdrawn.

The patents to Tyszblat, Kondo and Beesabathina have also been considered. Applicant submits that none of these references adds anything to the teachings of the previously discussed references so as to suggest the presently claimed invention. Therefore, it is respectfully submitted that the rejections of claims 16, 18-21, and 43 under 35 USC 103 (a) are overcome and should be withdrawn.

Reconsideration and allowance of the present application are respectfully requested.

Any additional fees or charges required at this time in connection with this application may be charged to Patent and Trademark Office Deposit Account No. 11-1835.

Respectfully submitted,

By

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, PO Box 1450 Alexandria, VA 22313-1450, on October 7, 2010.

By: Klaus P. Stoffel Date: October 7, 2010